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ELECTRICAL GENERATING PLANTS :
UP TO 100 kW

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ELECTRICAL GENERATING PLANTS (UP TO 100 kW)

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Power Generation in U.A.R.

1. In the U.A.R. the task of electrical power generation, transmission and distribution is undertaken by several governmental electricity authorities. These authorities feed all types of loads all over the country, such as municipalities, irrigation and drainage pumping stations, industrial plants, and the large public utility, industrial and traction loads in Cairo and Alexandria.
2. Apart from the above mentioned electricity authorities, there are many industrial companies which generate electrical energy for their own industrial use. Some of these companies combine the production of electrical energy with the economic generation of steam for their own industrial process, such as in the sugar, textile and paper industries.
3. All these electrical energy producers are operating and expanding their systems according to a long range coordinated plan, under the supervision of the U.A.R. Electricity Commission.
4. According to the 1961 statistics, the total installed capacity of these systems is 1308 M.W. and the total energy generated is 3722 million kWh. Although power stations in these systems are not fully interconnected, yet a project is now under adjudication for the construction of 770 kilometers of 220 kV transmission lines and the necessary transformer and switching sub-stations necessary for the complete interconnection of the power stations in Cairo and Alexandria with all other stations in the Delta and Suez.
5. Besides these electrical power systems, there are many small private stationary engines dispersed all over the country. These engines are employed either to drive directly their respective mechanical loads or generate electricity of these engines amounts to more than one million horse-power. The driving engines are either Diesel, semi-diesel, steam, petrol or kerosene engines.

Hydro-electric Plants:

6. The United Arab Republic has got an elaborate system of irrigation depending on several barrages on the Nile as well as numerous regulators on the main and subsidiary canals.

7. Studies for the utilisation of the potential energy prevailing at the main barrages and some of the existing regulators have been made. The conclusion arrived at was that the "Tubular Kaplan turbines coupled to their alternators" were the most suitable and economical units for use on the regulators. The power of these units shall not exceed 100 kW in most cases.

8. In case they could not be installed in the openings on the regulators, they could be installed in simple power houses built on canal diversions. They could also be installed in such a way that they could be easily lifted for repair or for any other purpose and put back in the opening when required. The turbines which are suitable for the main barrages on the Nile have not been mentioned as they are of much higher power than 100 kW.

Thermal Plants:

9. A great number of electric generating plants with internal combustion engines as prime movers were installed in the United Arab Republic in the last few years. The fuel used is petrol, kerosine, solar and Diesel oil. The generators are mostly D.C. The generating sets are used for supplying light or light and power for houses in the country, and light and power for small factories and workshops either in the country or in towns and cities.

10. Difficulties were encountered at the beginning in maintaining Diesel engines owing to the shortage of skilled labour and maintenance workshops. But the difficulties were gradually overcome.

11. The following points are recommended when dealing with less developed countries: -

- (a) The altitude and the maximum air temperature when fixing the rated output of the generating sets.
- (b) Fitting the engines with renewable liners, so that liners and pistons could be easily changed when necessary.
- (c) When compressed air is required for starting the engine, the air bottle should be of sufficient capacity for ten faulty starts at least.

- (d) Fitting efficient air filters to the engines.
- (e) When Diesel oil is used as fuel, heaters should be installed in the main fuel reservoirs and solar or kerosine service tanks should also be installed for starting purposes.
- (f) Supplying an adequate oil purifier for reconditioning the lubricating oil.
- (g) Furnishing engines up to 25 B.H.P. with a thermosyphon cooling systems, and for higher powers with a cooling tower.
- (h) Engine makers should supply complete executive drawings and specifications for the engine foundations which should also suit the nature of the soil on site.
- (i) Engine makers should supply an instruction book for running, adjusting and carrying out minor and major repairs in the engine.
- (j) Maintenance workshops and skilled mechanics should be available.
- (k) To offer A.C. three phases 50 cycles alternators is preferable whenever possible when feeding motor powers in order to avoid changing the motors in future if the motors are fed from an electric net system.
- (l) It is preferable in hot countries to use class B insulation.
- (m) The generators and engines should be erected on one common bed plate.
- (n) Spare parts should be made available at a reasonable price.

Non conventional:

12. Some trials were made for generating electricity from sun rays, but the costs were high and the trials were abandoned. Wind mills are used in very small numbers for electric generation as their power besides being very small is not firm.

U.A.R. Electrification Scheme:

13. Cheap energy is generally considered as the basis of sound economical development. Electrification schemes should thus be prepared so as to supply all the consumers,

whether industries, utilities or rural with cheap electrical energy.

14. The plan of the electrification of U.A.R. is based on the study of the future power requirements and the installation of large, high efficiency thermal units to cope with these requirements where fuel and water are economically available. Generation of electrical energy in large central power stations and distributing the energy to the different consumers has proved to be more economical than generating the energy independently for the supply of local needs.

15. The energy generated in central stations is then transmitted through a high voltage transmission - inter-connection system, and distributed on all municipal, industrial and rural consumers. The Nile water power will also be fully utilised and the production of the thermal and hydro-electrical energy will be economically co-ordinated.

16. For the purpose of promoting rural electrification, the five-year plan of electrification comprises the erection and expansion of the medium voltage distribution networks (11kV, 6.6 kV and 3.3 kV) and the low voltage 380/220 volt, local networks of the different municipalities and villages. In arid areas and for villages and towns far from the distribution networks the electrification plan provides for the erection of Diesel - electric statias and the expansion of the existing ones.